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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/551,517

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William C. Breneman

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KLARQUIST SPARKMAN, LLP
121 SW SALMON STREET
SUITE 1600
PORTLAND, OR 97204

EXAMINER

NGUYEN, NGOC YEN M

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/551,517	Applicant(s) BRENEMAN, WILLIAM C.	
	Examiner Ngoc-Yen M. Nguyen	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 September 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 28, 2009 has been entered.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1, 8, 15, it is unclear what is required by "the amount of the hydrate and the water content thereof being sufficient to completely hydrate all the metal chloride". In these claims, the water vapor, which is released from the powdered hydrate, is required in the heating step to react with the metal chloride, however, in the instant specification, it is disclosed that "upon exposure to metal chlorides in the wastes, the hydrate is at least partially dehydrated by a transfer of water to the metal chlorides. The transferred water forms aluminum chloride hydrate (for example) and silica. The amount of hydrate supplied and the water content thereof should be chosen to be sufficient to completely hydrate all the metal chloride of the waste" (note page 9, lines

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27-32). The transfer of the hydrate as disclosed in the instant specification is not considered as a reaction because the new product is formed. Thus, it is unclear if the instant claims require a reaction between the water and the metal chloride (i.e. to form HCl, for example) or just merely transfer the hydrate from the powdered hydrate to the metal chloride.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruff et al (5,066,472) in view of WO 03/033115 (using Hirano et al 2004/0258596 as unofficial English translation) and Terry et al (3,900,312).

Ruff '472 discloses a method for processing a chlorosilane containing residue produced as bottom product after the distillation of chlorosilanes from hydrochlorination or chlorination of silicon to recover the chlorosilanes and hydrogen chloride comprising: separating the chlorosilanes contained in the residue; treating the remaining residue with water vapor in the presence of additional hydrogen chloride to recover hydrogen chloride from a resulting gaseous mixture (note claim 1). The amount of steam added determines the degree of hydrolysis of the metal chlorides (note column 2, lines 23-24).

For the source of the residue, it would have been obvious to one of ordinary skill in the art to use any waste source, i.e. residue, from any the process as the starting residue to be treated in the process of Ruff '472 as long as such residue contains metal chloride(s) that need(s) to be removed.

The difference is Ruff '472 does not disclose (1) the use of a powdered hydrate to react with the metal chloride and (2) the presence of sodium chloride.

For difference (1), WO '115 discloses a method for removing a halogen series gas by contacting a gas containing halogen series gas forming at least one kind selected from the group consisting of HF, HCl, HBr and HI by water with a granule containing from 60 to 99.9 mass % of a solid base and from 0.1 to 40 mass% of a carbonaceous material to the total mass amount of the granule in the presence of water (note WO '115, claim or Hirano '596, claim 1).

WO '115 teaches that using a dry type treating method would make an apparatus smaller and simplify operation and maintenance of the apparatus (note WO '115, paragraph bridging pages 1-2 or Hirano '596 paragraph [0004]). The process of WO '115 can be carried without providing new equipment or a packing, it is possible to have water present necessary for forming an acid gas such as HF, HCl, HBr or HI from a present halogen series gas. Thus, it has been newly discovered that the problem can be solved by selecting a solid base such as sodium hydrogencarbonate or potassium hydrogencarbonate which form water by neutralization of the granule (note WO '115, page 3, middle paragraph or Hirano '596, paragraph [0009]). WO '115 teaches that the treatment of the hydrolysable present halogen series gas can be carried out by

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selecting a solid base forming water by neutralization as a solid base for the present granule without providing new equipment for a packing. Also, the present granule becomes an efficient removing agent by accelerating hydrolysis by the function of a pore volume and a specific area of an activated carbon contained therein (note WO '115, page 4, first paragraph or Hirano '596, paragraph [0011]). When the solid base in the granule is sodium hydrogen-carbonate or potassium hydrogencarbonate, it is water-soluble and most of reaction products with the halogen series gas are also water soluble salts (note WO '115, paragraph bridging pages 12-13 or Hirano '596, paragraph [0050]).

It would have been obvious to one of ordinary skill in the art to replace the hydrogencarbonate used WO '115 with other solid base and when the other solid base does not contain water, it would have been obvious to one skilled in the art to include an additional source of water with the other solid base. Since WO '115 prefers a dry type treating method, one skilled in the art would select any appropriate solid source that contains water so that the residue can be treated in dry type treating method.

In Ruff '472, the remaining residue is hydrolyzed to obtain HCl in the presence of additional HCl, this step would require acid-resistant construction material for the apparatus because HCl is formed at high temperature (note claim 1). Thus, when the benefit of recovering the HCl from the metal chlorides in the remaining residue is less than the cost of the apparatus for carrying out the hydrolysis of the metal chlorides, it would have been obvious to one of ordinary skill in the art at the time the invention to simply neutralize the HCl to safely dispose of it.

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to contact the remaining residue containing metal chlorides as disclosed in the process of Ruff '472 with a solid base, as suggested by WO '115 because the solid base could not only provide the water for the hydrolysis of the metal chlorides but also neutralize the HCl formed by the hydrolysis to render the remaining residue safe for disposal. The process as suggested by WO '115 could be carried out in the same apparatus for the step of separating the chlorosilane, and no acid-resistant material is required for such apparatus thereby lower the cost the equipment for the overall process.

For difference (2), Ruff '471 discloses that the residue contains aluminum and it is desirable to keep aluminum chloride from vaporizing (note column 1, lines 60-66).

Terry '312 is applied to teach that it is known and conventional in the art to add NaCl to aluminum chloride to lower the vapor pressure of the latter and thereby maintain the aluminum chloride in liquid phase (note claim 5, step c).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add NaCl to the residue of Ruff '471, as suggested by Terry '312 in order to lower the vapor pressure of the aluminum chloride contained in the residue and thereby maintain the aluminum chloride in liquid phase so that only chlorosilane is recovered in the separating step.

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Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breneman et al (4,743,344) in view of WO '115 (using Hirano '596 as an unofficial English translation), Keller et al (3,878,291) and Terry '312.

Breneman '344 discloses a process for treating a waste slurry which includes silicon, iron, and aluminum metal particles, chlorides of iron and aluminum, silicon tetrachloride (STC) and trichlorosilane (TCS), and materials having boiling points which are lower than STC and TCS, with said STC and TCS being, in the aggregate, the predominant constituents of the slurry, comprising:

(a) feeding the said waste slurry to a first separation column, to provide STC, TCS, materials boiling lower than STC and TCS, and materials boiling intermediate STC and TCS as overhead from said first separation column, and to provide silicon, iron, aluminum metal particles and chlorides of iron and aluminum as bottoms in said first separation column which is passed to a waste storage vessel;

(b) condensing the overhead from the first separation column and passing this condensed overhead to a second separation column in which (i) STC is recovered as bottoms and (ii) materials boiling lower than STC, including TCS and materials boiling intermediate STC and TCS are recovered as overhead;

(c) condensing the overhead from the second separation column and passing this condensed overhead to a third separation column in which (i) TCS is recovered as overhead (ii) materials boiling intermediate STC and TCS are recovered as a bottoms waste stream (note claim 1).

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Breneman '344 discloses that the concentrated metal chloride residue recovered are neutralized or combusted with a suitable hydrocarbon after being purged to the portable receiver (note column 2, lines 62-66).

The metal chloride residue in Breneman '344 comprises Si, FeCl_3 , AlCl_3 (note column 4, lines 8-9).

The differences are Breneman '344 does not disclose (1) the step of heating the concentrated metal chloride residue with a powdered hydrate and (2) the addition of NaCl to the metal chloride residue.

For difference (1), WO '115 is applied as stated above to teach the advantages for using a solid base to remove the acid gas formed from the hydrolysis of the metal chlorides over the step of absorbing in water as disclosed in Keller '291. WO '115 teaches that dry type treating method is preferred because the equipment used can be smaller, easier to maintain and the operation is simpler.

Keller '291 discloses a process for the production of chlorosilane (note title). In the process, a solid residue comprising aluminum chloride, iron chloride as well as FeSi dust and ashes is formed. A solid liquid mixture is fed into a paddle dryer and a mixture of silicon tetrachloride and titanium tetrachloride is separated from the solids (note column 5, lines 32-45). After drying off the solids has taken place, steam is blown for hydrolysis. The hydrogen chloride set free is absorbed in water and returned to the process (note column 5, lines 50-57). Thus, Keller '291 fairly teaches the solid metal chlorides, such as aluminum chloride and iron chloride, can be hydrolyzed to produce HCl by treating it with steam, i.e. water vapor.

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It would have been obvious to one skilled in the art at the time the invention was made to treat the solid impurities (i.e., solid residues) in the process of Breneman '344 by first hydrolyzing to produce HCl and then neutralize it by reacting the HCl with a base using a dry method as suggested by Hirano '856 because as evidenced by Keller '291, the solid residues in Breneman '344, which contains iron and aluminum chlorides, can be hydrolyzed to form HCl and because the dry method as suggested by Hirano '856 has the following advantages: enable prolongation of life, low cost, compacting of equipment, easiness of maintenance and treatment of a byproduct after removal, safety by reducing heat generation due to heat of adsorption, easiness of predicting life of a removing agent and the like by only one agent (note paragraph [0015] of Hirano '596).

For difference (2), Keller can further be applied to teach that sodium chloride is added to a stream containing titanium tetrachloride to form a complex sodium aluminum chloride which can be easily separated from the titanium tetrachloride (note column 5, lines 40-45).

Optionally, Terry '312 is applied as stated in the above rejection to teach the addition of sodium chloride to lower the vapor pressure of aluminum chloride.

For other dependent claims, note reasons as stated in the above rejections.

Applicant's arguments filed September 28, 2009 have been fully considered but they are not persuasive.

Applicants argue that the method of WO '115 is concerned with "removing a halogen series gas", not in treating a chloride-bearing solid material.

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WO '115 discloses a process having a first step of hydrolyzing a halogen gas to form a hydrogen halide (i.e., HF, HCl, etc.) and then neutralize the hydrogen halide by reacting with a solid base. It should be noted that in WO '115, the halogen series gas is not limited to just elemental fluorine, chlorine, bromine, but the halogen series gas as defined in WO '115 as a "halogen series gas forming HF, HCl, HBr or HI by water" and "a gas to be treated by the present granule may contain a halogen series gas other than the present halogen series gas" (note paragraph [0015] of Hirano '596), i.e. any halogen containing gas that can be hydrolyzed to form HF, HCl, HBr or HI. In Breneman '344, the need of neutralizing metal chloride residues is disclosed (note column 2, lines 62-64), thus, it would have been obvious to use of the process of WO '115 to neutralize the metal chloride residues of Breneman '344 as long as the metal chloride residues can be hydrolyze to form HCl (as evidenced by Keller '291, note column 5, lines 50-55).

Applicants argue that any contacting device designed for WO '115 gas treatment process would be unsuitable for treating a chloride-bearing solid material.

As disclosed in WO '115, the water for hydrolyzing the halogen gas series (note Formula 1) is provided initially as water deposited on the granule and thereafter, water is provided as a reaction product of the granule (note paragraph [0027] of Hirano '596). Thus, when hydrolyzing the solid chloride residues, it would have been obvious to mix the solid chloride residues and the granule to provide contact between the solid chloride residues with the water that will be released from the granule.

Applicants argue that WO '115 will not achieve its desired results unless a halogen series gas is present at the outset.

Granted that the starting material disclosed in WO '115 is disclosed to be a halogen series gas, however, the material or compound that is actually be removed by the granule is HCl. The HCl in WO '115 is formed by hydrolyzing a halogen series gas, however, the process of WO '115 would be as equally applicable to remove HCl which is formed from a different starting material, such as by hydrolyzing a solid metal chloride.

Applicants argue that none of the cited publications describes or suggest the advantageous use of a hydrate that can be heated to release water vapor and thereby avoid the need to add liquid or gaseous water from an outside source.

WO '115 teaches the use of a solid base, such as sodium hydrogen carbonate to provide the water required to hydrolyze the halogen gas series (note paragraphs [0011], [0027] of Hirano '596).

Applicants argue that the sodium hydrogencarbonate or potassium hydrogencarbonate as disclosed in WO '115 are not hydrates.

The sodium hydrogencarbonate and sodium sesquicarbonate (note paragraph [0019] of Hirano '596) as disclosed in WO '115 are the same as the sodium bicarbonate and sodium sesquicarbonate, which are disclosed in Applicants' specification as suitable alkaline hydrates.

Applicants argue that Hirano discloses that some amount of water is formed by the reaction of formula 2, but that is not the method that is claimed in Applicants' application.

Again, WO '115 discloses that initially the water is provided by the amount in air and water deposited on the present granule. The reactions as disclosed in Hirano between chlorine and sodium hydrogencarbonate are only exemplified reactions. As shown in formula 8, sodium hydrogencarbonate reacts with HCl to form sodium chloride, carbon dioxide and water.

Applicants argue there is nothing in the cited publications to suggest methods with "the amount of the hydrate and the water content thereof being sufficient to completely hydrate all the metal chloride".

Based on the teaching of Breneman and WO '115, all of the solid chloride residue needs to be neutralized, i.e., all HCl generated by hydrolyzed the solid chloride residue must be neutralized, thus, it would have been obvious to one skilled in the art to provide sufficient amount granule, i.e. of solid base and other components in the granule to fully neutralized the solid chloride residue.

Applicants argue that the claimed methods proceed, without the formation of a liquid waste product.

In Ruff '472, the distillation residue may start out as a suspension (i.e. liquid containing solids); however, after the step of separating the chlorosilanes, the solid content will increase to more than 90% (note column 2, lines 2, and lines 59-65). This remaining residue, after the step of separating the chlorosilanes, is considered as a

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"flowable solid material" as required in Applicants' claim 1. When Ruff '472 is taken in view of WO '115, it would have been obvious to one skilled in the art to use a dry type scrubber with solid base, as suggested by WO '115, to hydrolyzing the metal chlorides contained in the remaining residue of Ruff '472. Applicants' claims do not exclude the use of a liquid containing waste before the step of removing trichlorosilane.

Applicants argue that in the claimed invention, HCl is released from water reactive metal chloride without forming an aqueous HCl.

WO '115 is applied above to suggest such feature.

Applicants argue that Ruff '472 does not suggest hydrolysis by heating a combination of two solids.

Granted that it is true, however, WO '115 is applied to suggest the use of dry scrubber using solid base to hydrolyze the metal chlorides in a waste. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicants argue that WO '115 does not suggest hydrolysis by heating a combination of two solids.

As stated above, the granule as disclosed in WO '115 is to provide the water needed to hydrolyze a halogen series gas to form hydrogen halide (e.g. HCl) and to remove the formed hydrogen halide by neutralization using a solid base. This process would be applicable to any halogen containing material, beside the disclosed halogen

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series gas, as long as the halogen containing material can be hydrolyzed to form HCl, such as the solid chloride residue disclosed in Breneman (the hydrolysis of the solid chloride residue is evidenced by Keller '291).

Applicants argue that Terry '312, Breneman '344 and Keller '291 do not suggest hydrolysis by heating a combination of two solids.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoc-Yen M. Nguyen whose telephone number is (571) 272-1356. The examiner can normally be reached on Part time schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Ngoc-Yen M. Nguyen/
Primary Examiner, Art Unit 1793

nmn
December 24, 2009